

airmoVOC BTEX/C6C12



Online GC-FID Model A21022



airmoVOC C6-C12 (used in airmOzone)

Analysis of up to 53 compounds from C6 to C12 and halogen compounds (TO14) or (PAMS), BTEX included.



airmoVOC BTEX MCERTS

Analysis of Benzene, Toluene, Ethylbenzene, M+P Xylene, O-Xylene, Cyclohexane and Styrene

- In option: Naphtalene, Phenol, 1,3-Butadiene

Applications

Air quality:

- Urban/Non urban area pollution control
- Indoor measurements
- BTEX / PAMS / CE analysis
- Ambient air control (PAMS and TO14)
- VOCs Ozone precursors
- Plant / process emissions

Process:

- Industrial Hygiene
- Fence line monitoring

Other:

- Wastewater plant, Purge and trap (method 502-2 or 524)
- Drinking water

Environment:

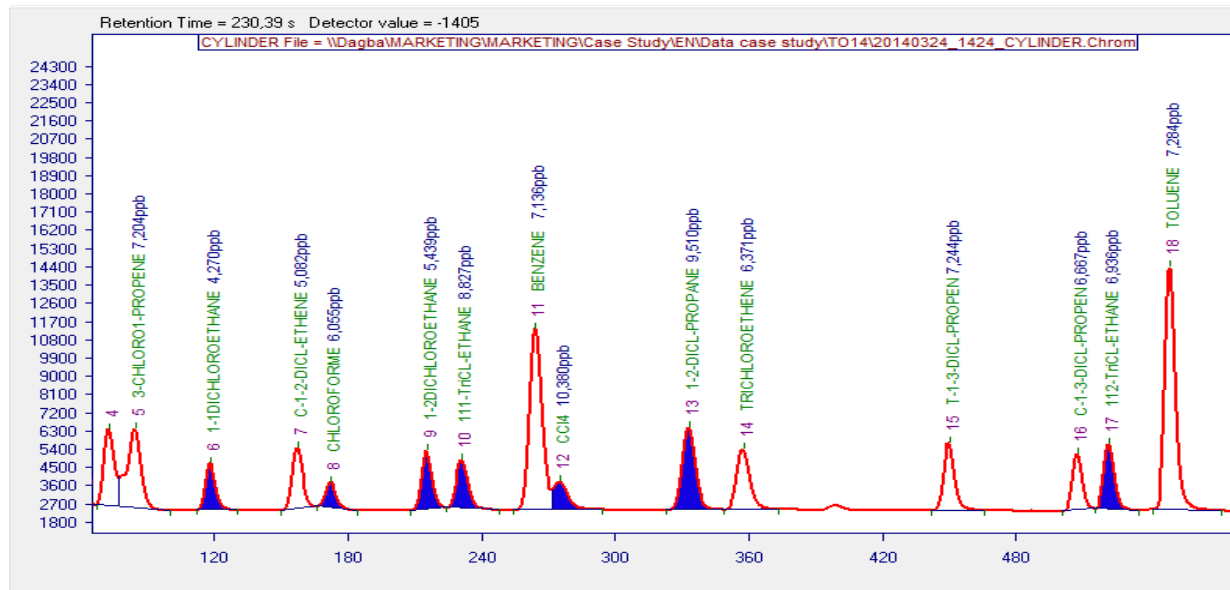
- Monitoring of urban and non-urban pollution
- Monitoring of industrial nuisance

Industrial:

- Industrial health and safety monitoring
- Process Quality Control

FID (airmoVOC) vs PID (airTOXIC)

- PID's UV lamp becomes dirty over time (need of calibration and self cleaning of the lamp)
- FID is the best solution for BTEX monitoring as it is stable, linear, sensitive and selective. It needs H₂ for the flame (gas generators provided to avoid gas cylinders use)

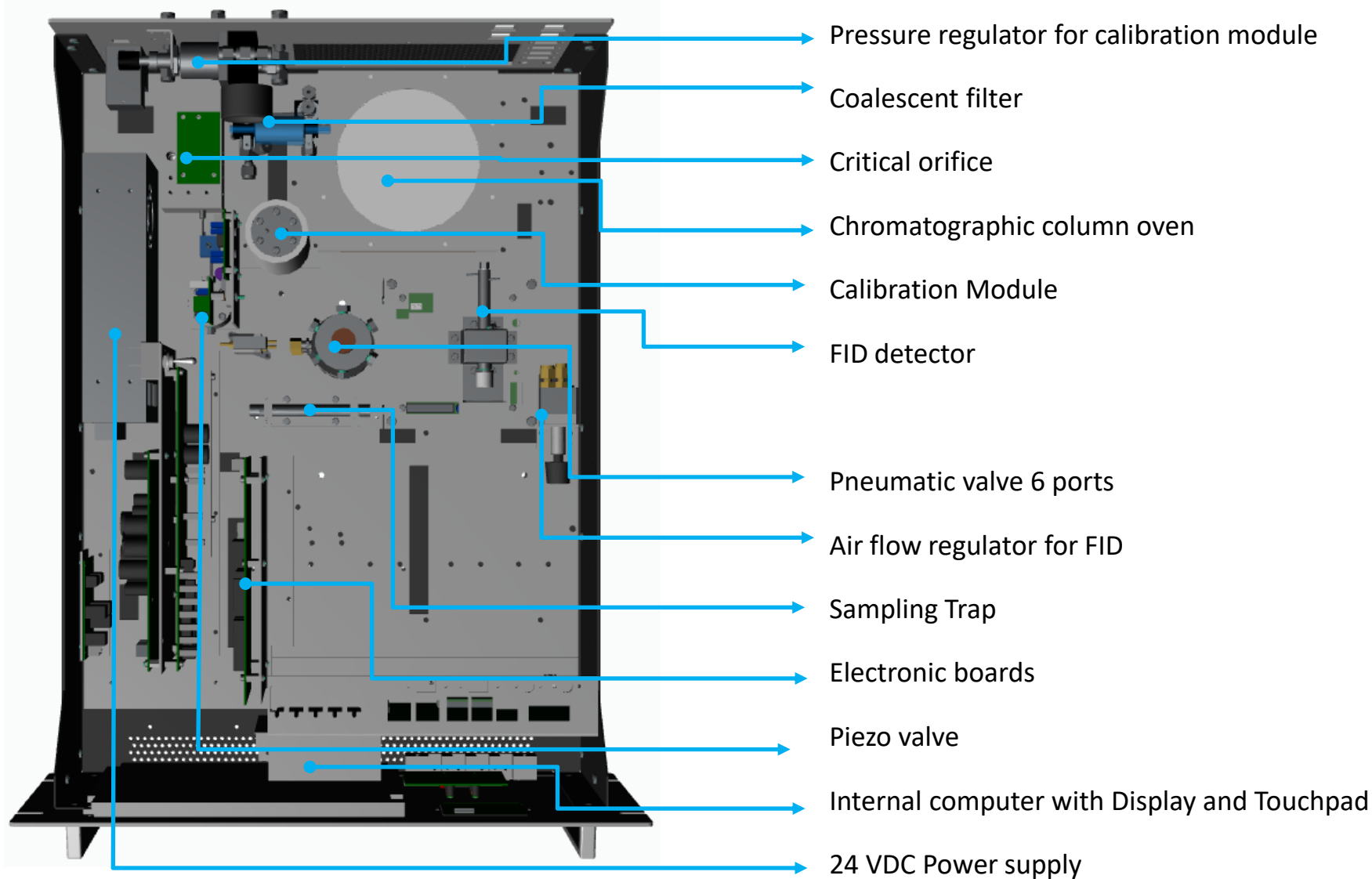


Blue peaks not identified by PID

- Top view
- Principle
- Installation
- Software
- Calibration
- Service
- Preventive maintenance
- Troubleshooting
- Remote control
- NEW!
- Chromatotec Technical website



Top View



Principle – Sampling phase

- The gas sample is drawn by a sampling pump through a trap



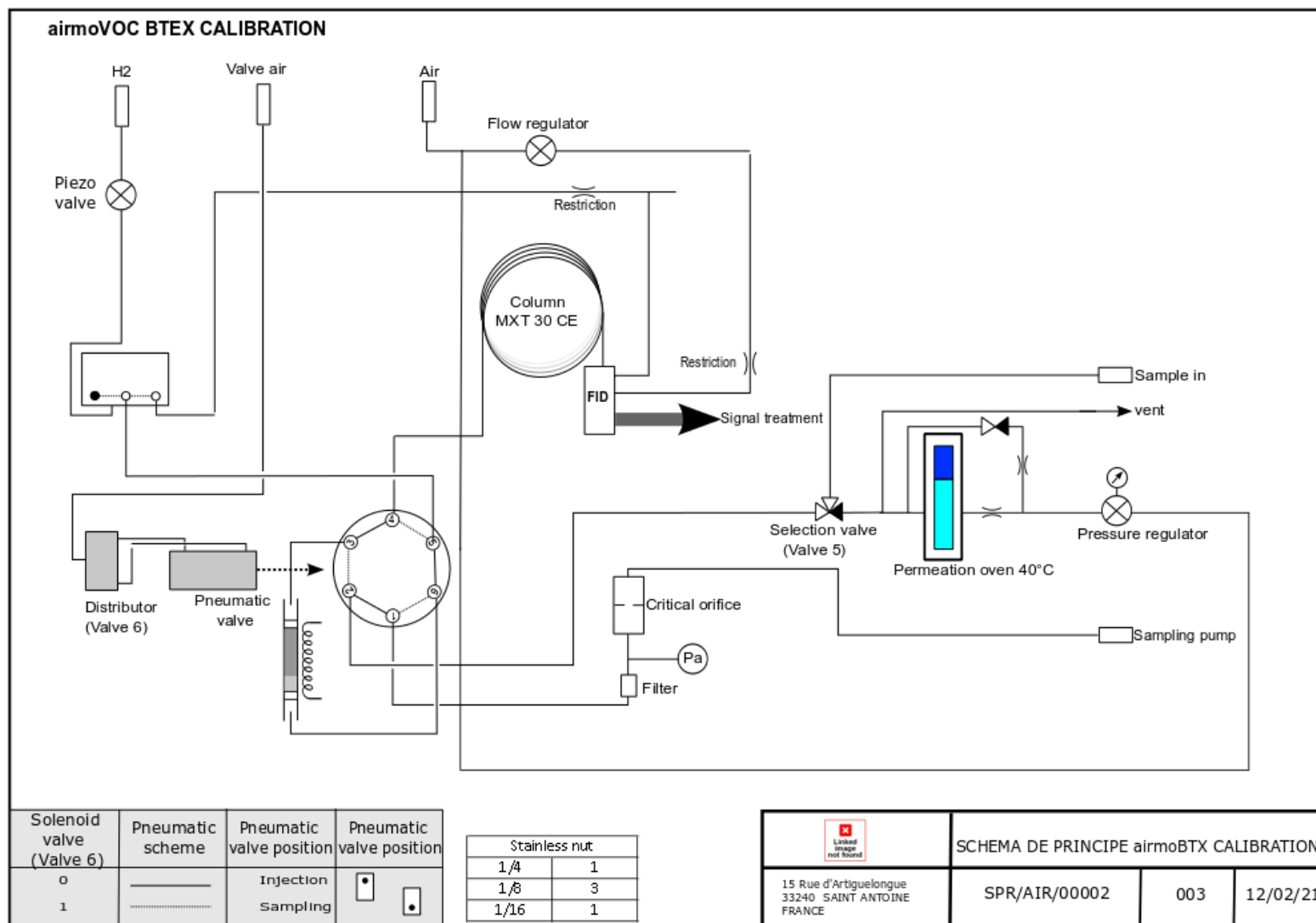
- VOCs in the sample are pre-concentrated on the adsorbent present in the trap
- The sampling flow is fixed by a critical orifice

Principle – Injection phase

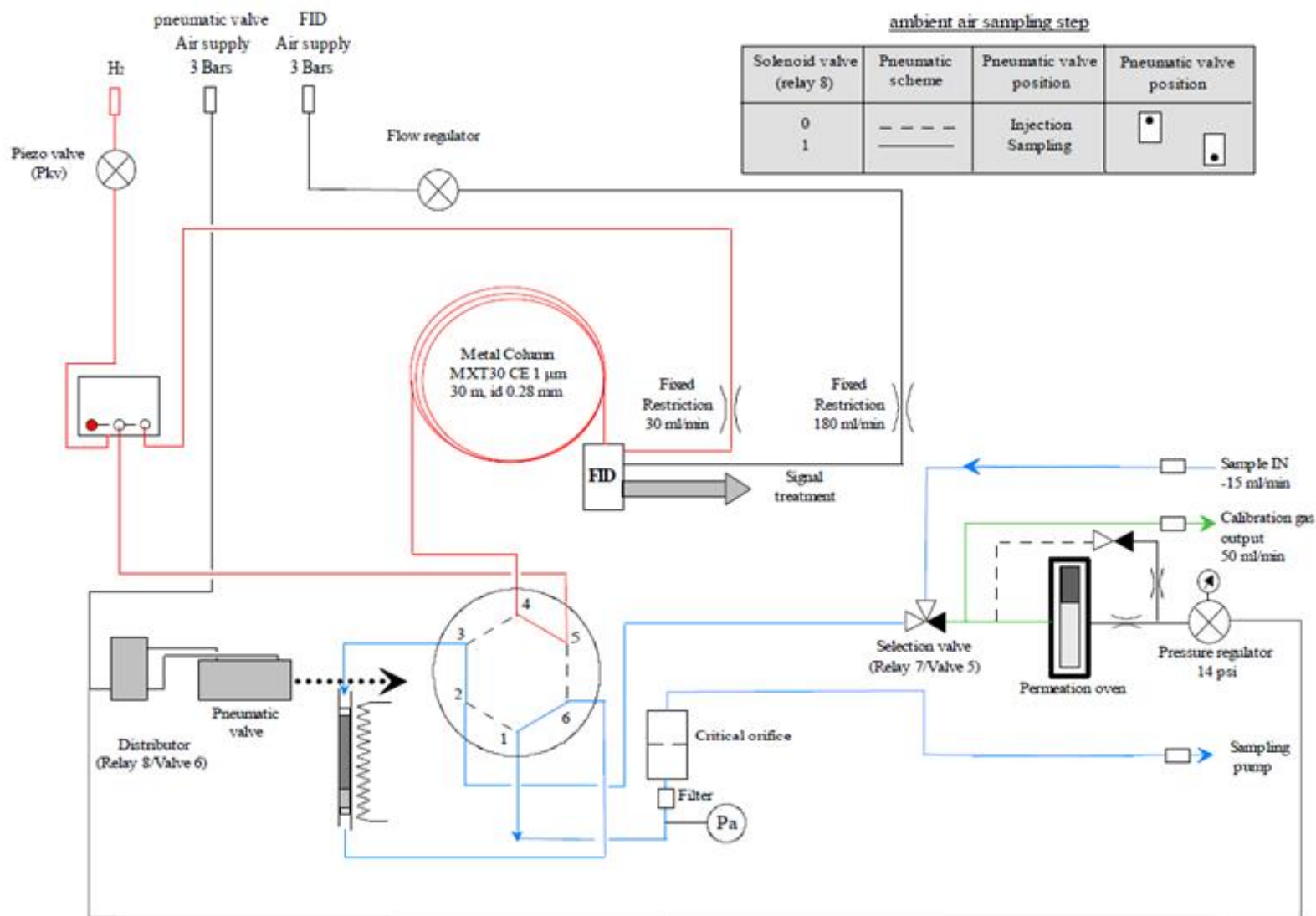


- The trap is heated to desorb the trapped VOC compounds
- The gaseous sample is introduced in the analytical column by the carrier gas flow (H_2)
- VOCs are separated by the analytical column and detected by the FID
- FID (**F**lame **I**onisation **D**etector):
 - Ions are formed during combustion of organic compounds in a hydrogen/air flame
 - The ions produce an electrical current = detector signal
 - The signal is recorded between the 2 electrodes

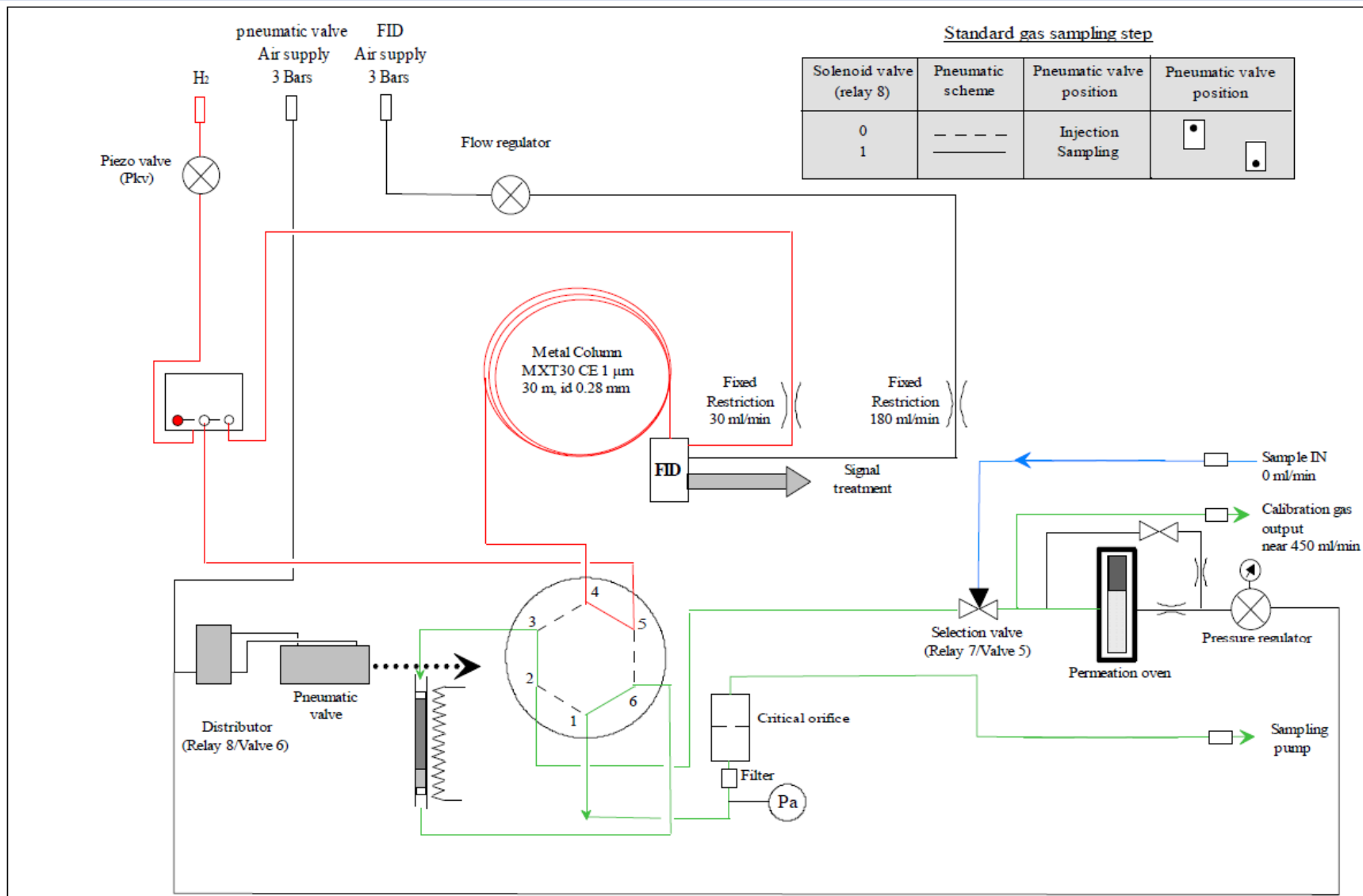
Principle – Pneumatic scheme



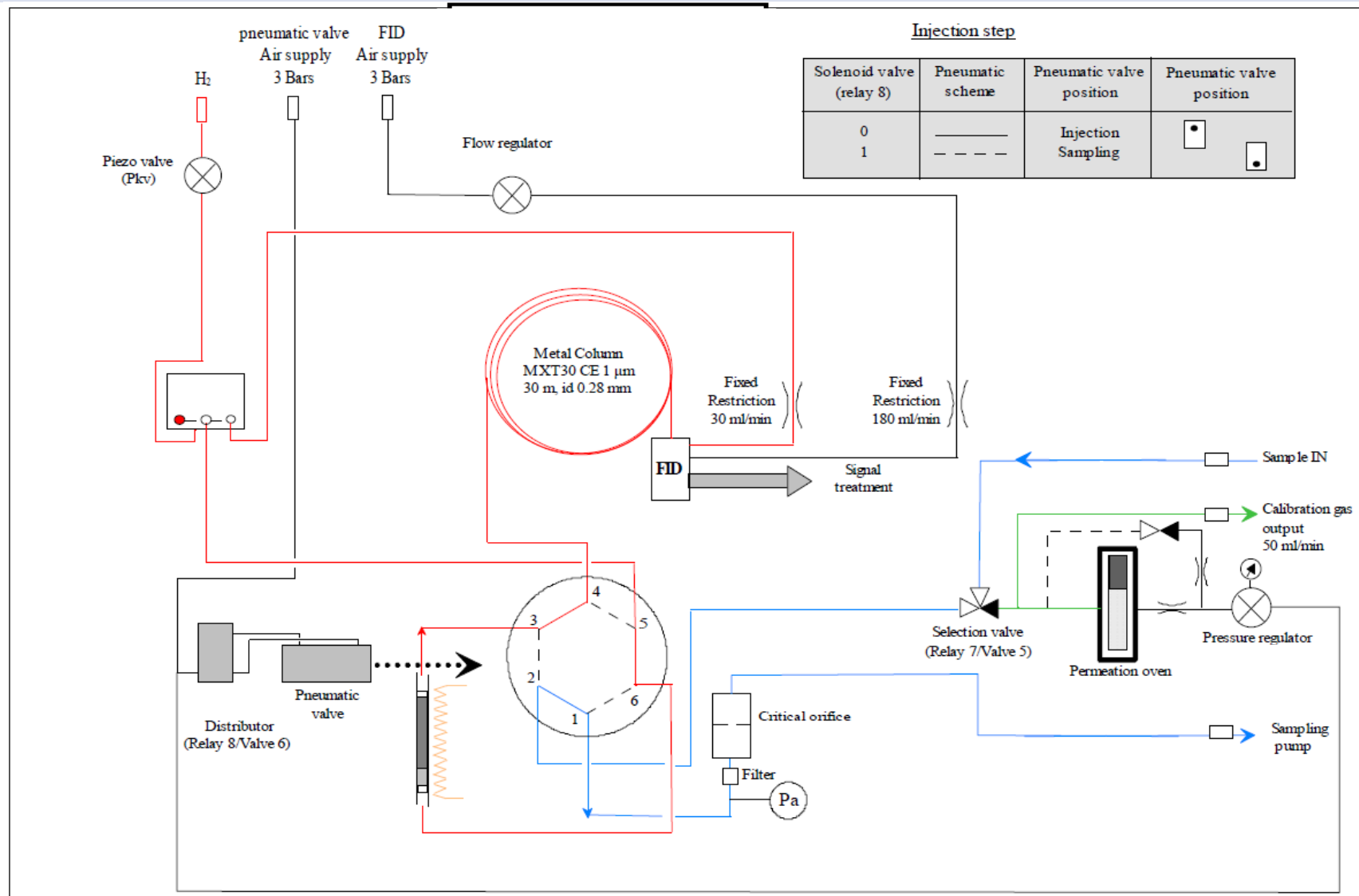
Principle – Ambient air sampling



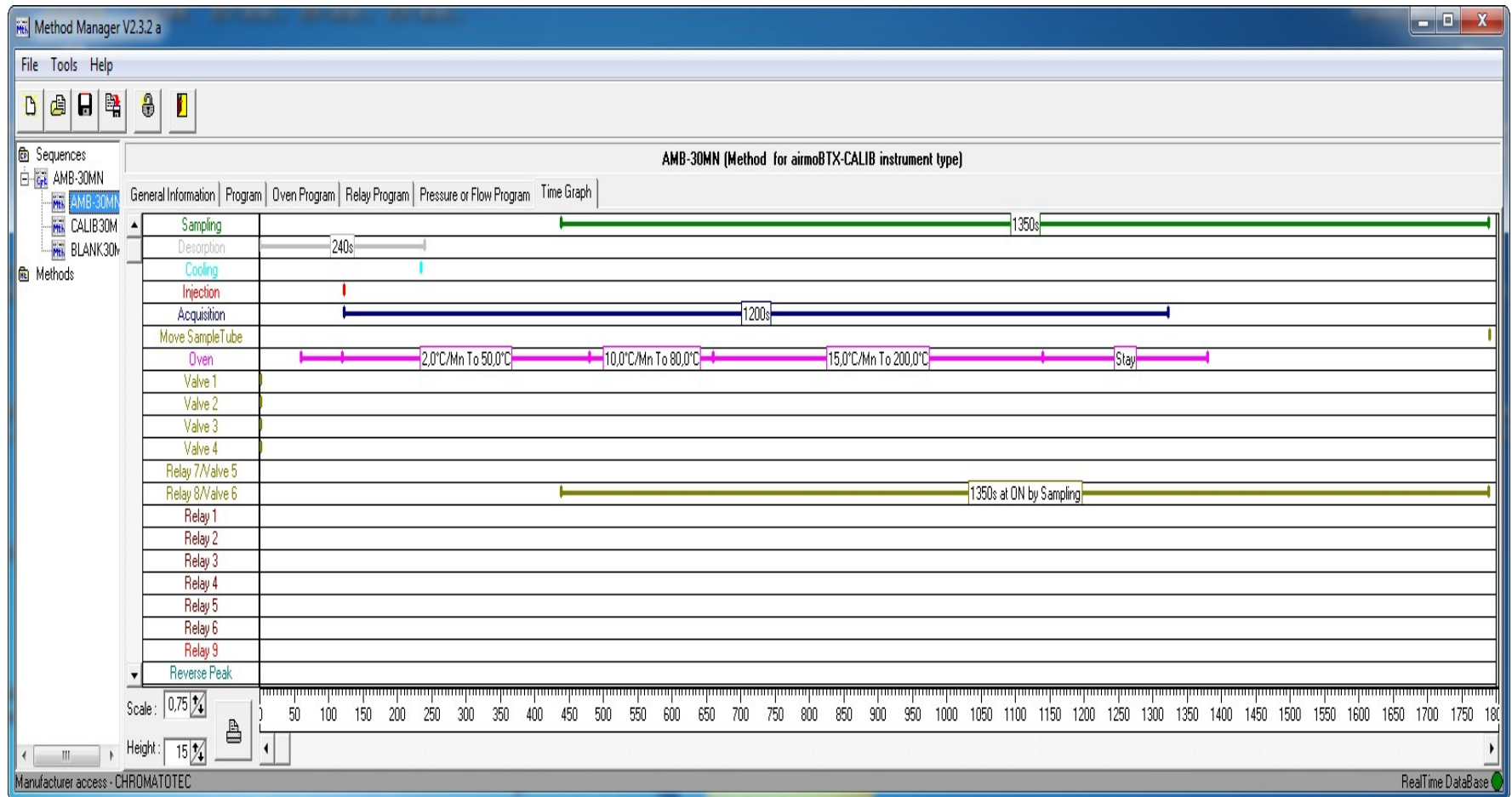
Principle – Standard gas sampling



Principle — Injection & Thermodesorption

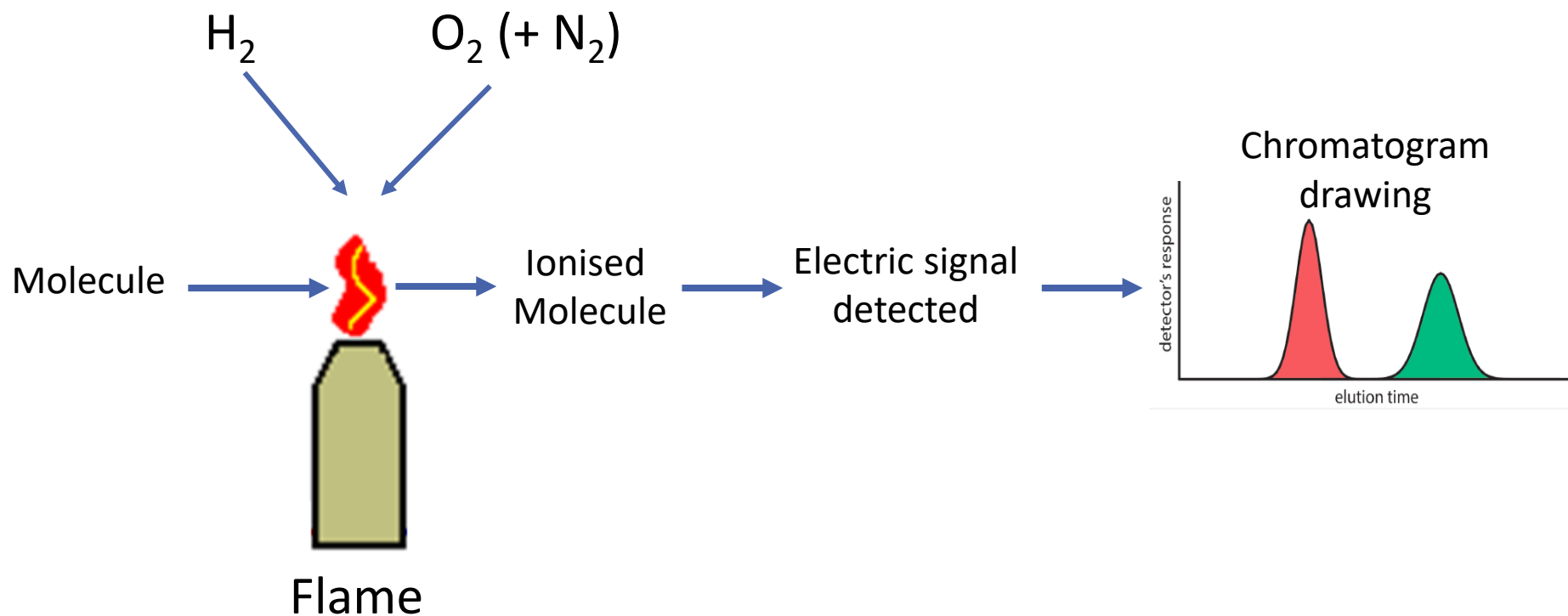


Principle – Analysis cycle



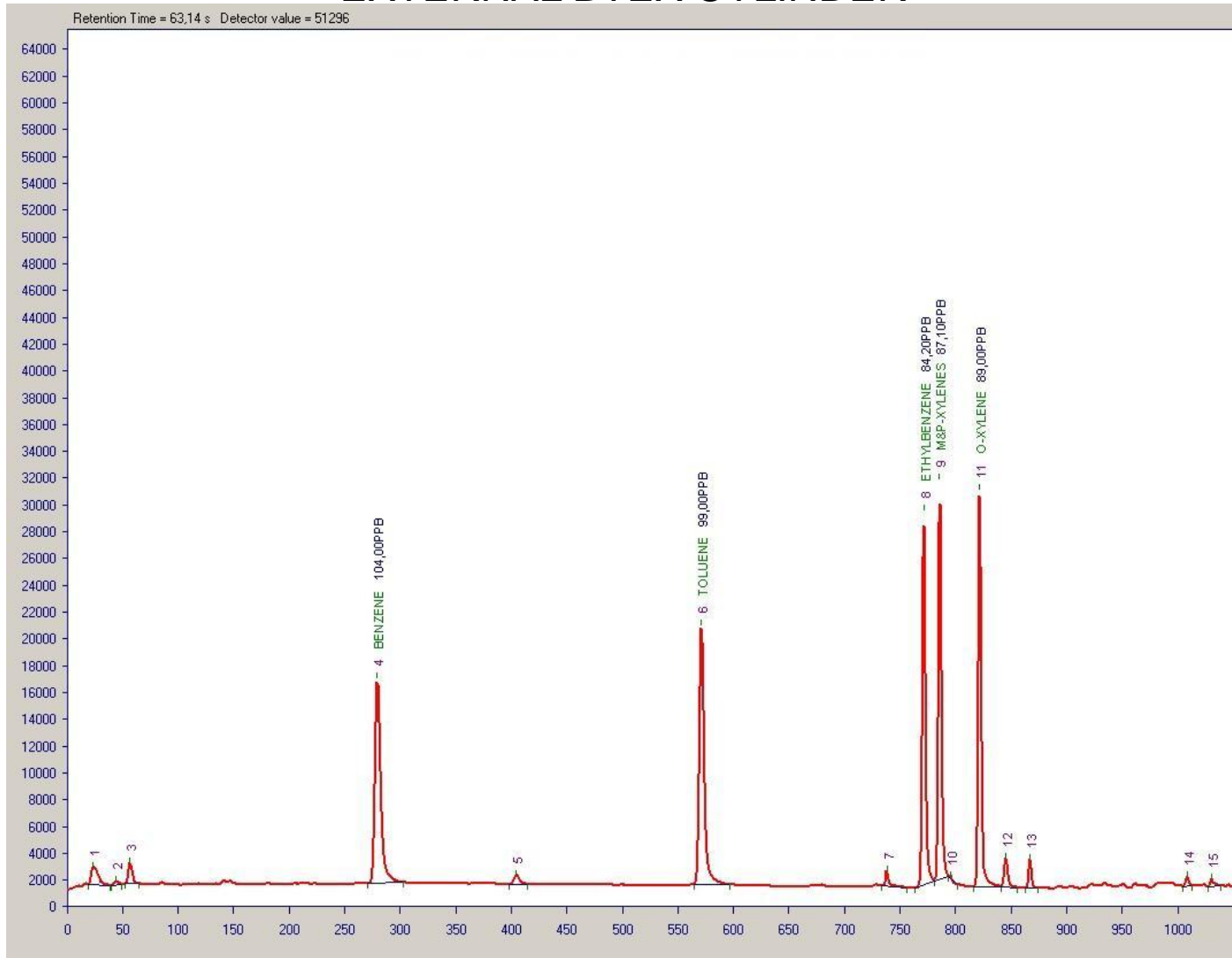
Principle – Detection

Flame Ionisation Detector (FID)



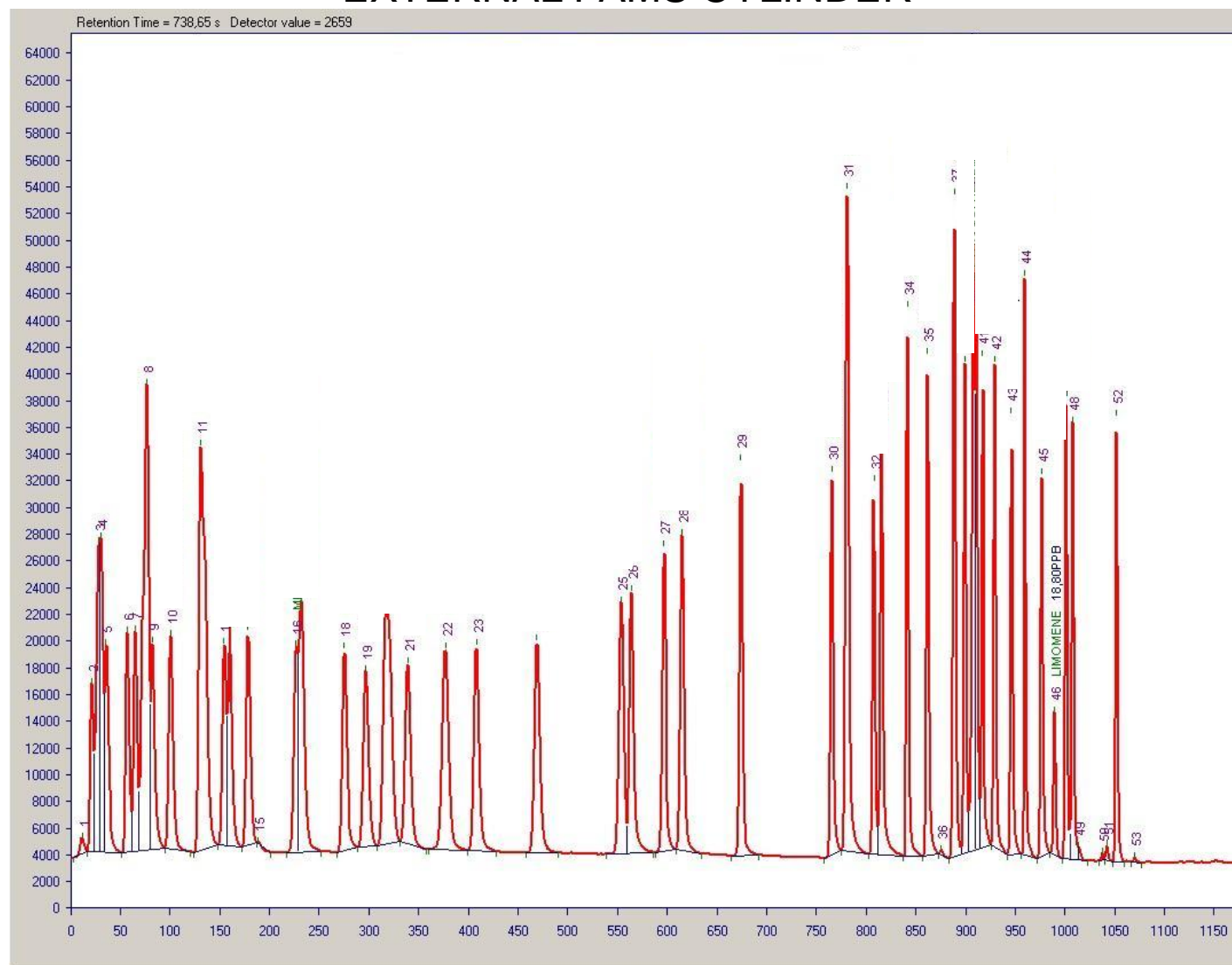
Principle – Chromatograms

EXTERNAL BTEX CYLINDER



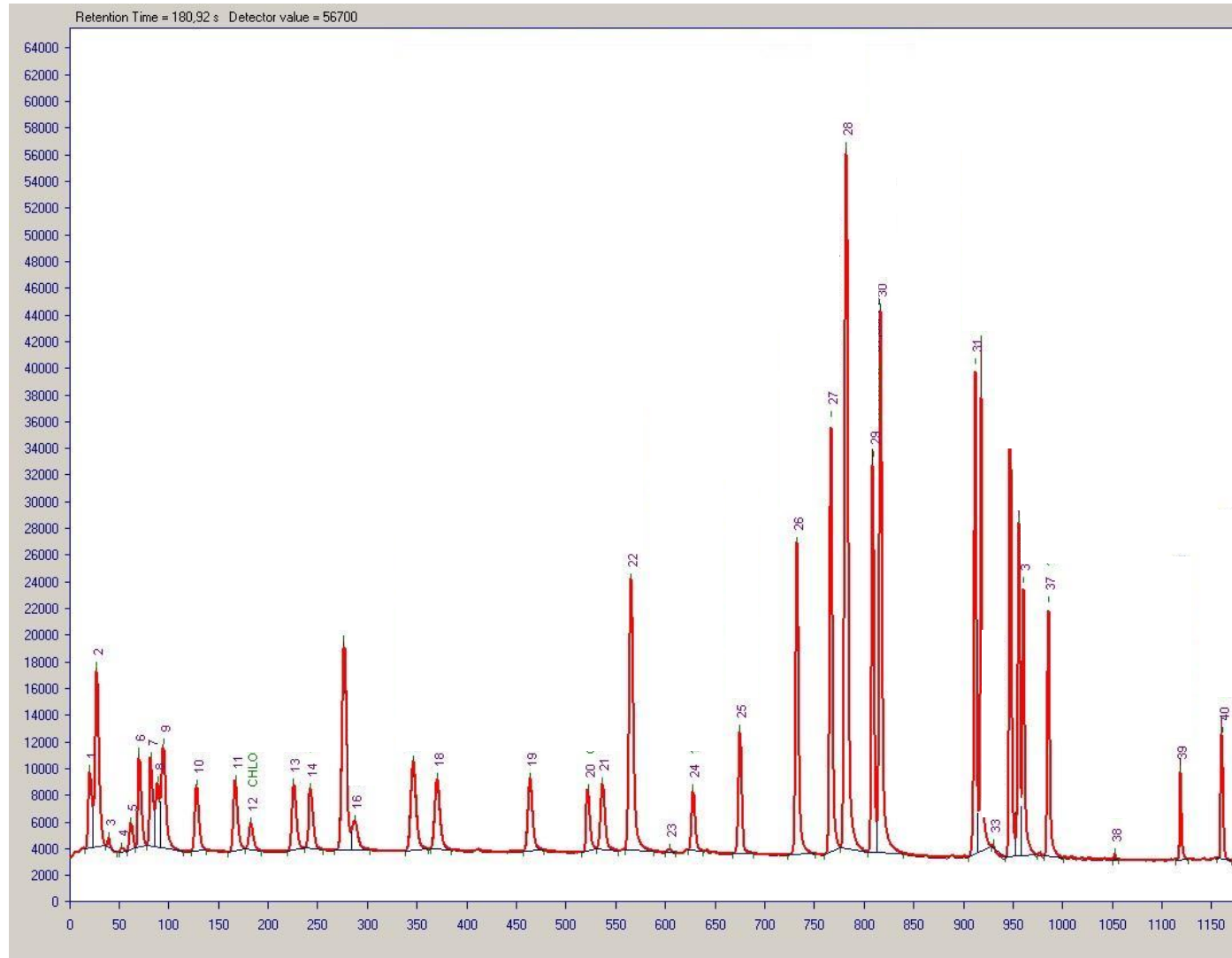
Principle – Chromatograms

EXTERNAL PAMS CYLINDER



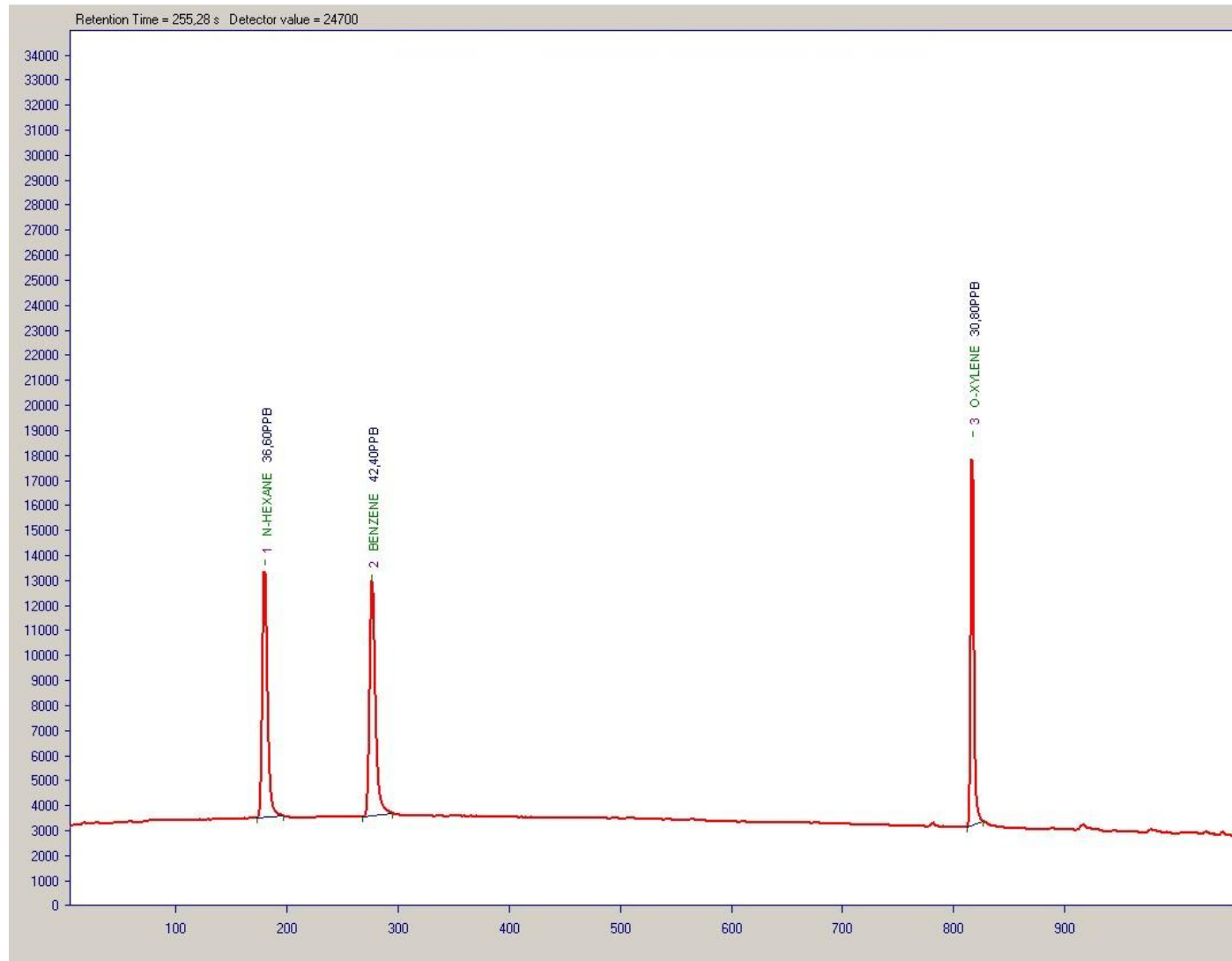
Principle – Chromatograms

EXTERNAL TO14 CYLINDER



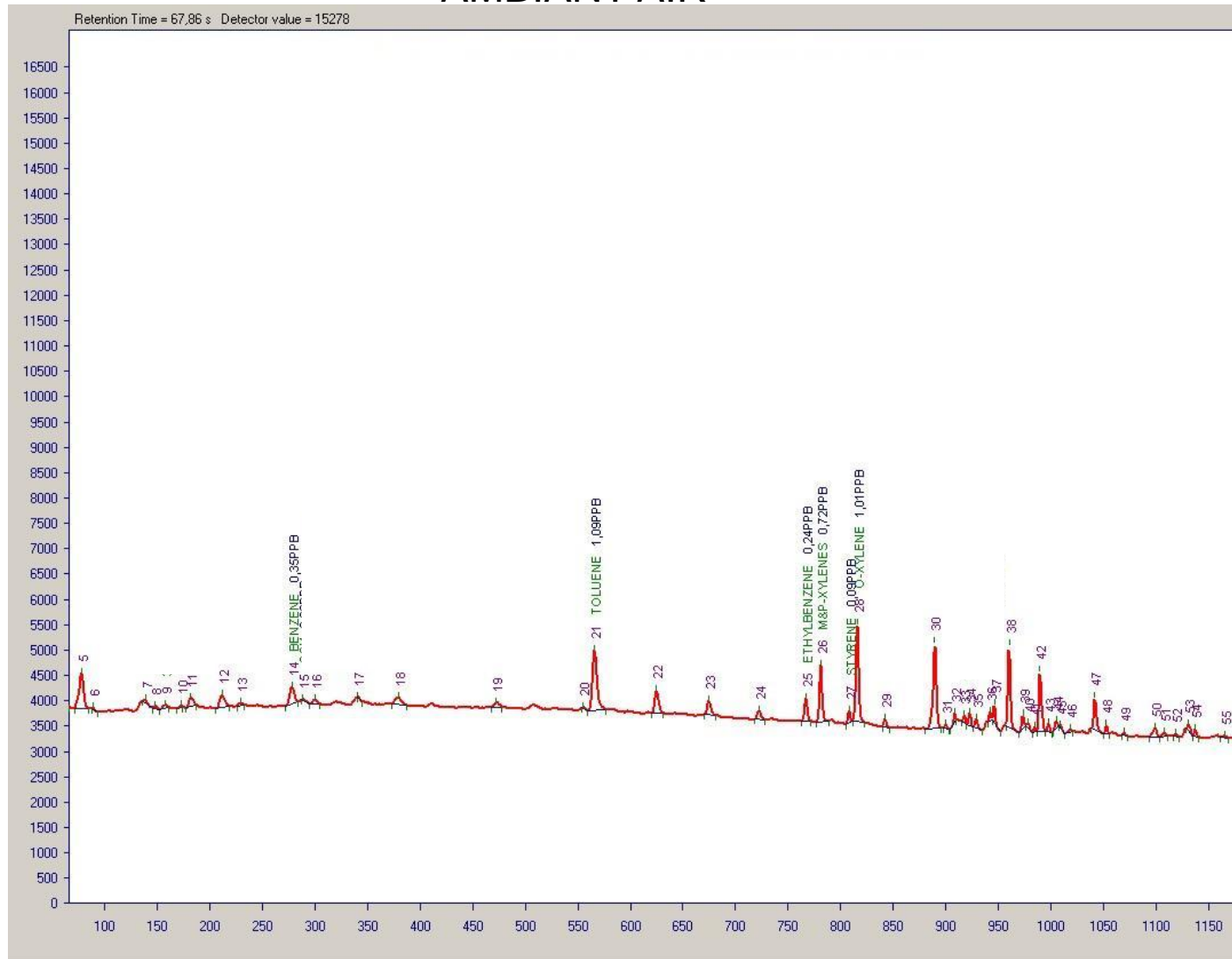
Principle – Chromatograms

INTERNAL PERMEATION OVEN



Principle – Chromatograms

AMBIANT AIR



Installation

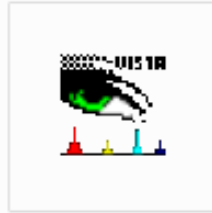
GAS		He (5.5)	H ₂ (Generator)	N ₂ (5.5)	Ar (6.0)	Zero air			
Inlet pressure		-----	2 Bars	-----	-----	FID	Hydroxylchem	Pneumatic Valve	Pentation oven
Using pressure		-----	409 (+/-5) hPa at 36°C	-----	-----	3 Bars	3 Bars	4 Bars	≈ 0.4 Bar
Flowrate (ml/min)		-----	-----	-----	-----	FID	Hydroxylchem	Pneumatic Valve	Pentation oven
			Carrier gas FID ≈ 3 27.5			180	175	-----	53.97 or 245.0

- Before unboxing the instrument
 - Read the QC report (most important document)
 - Read the easy start document
 - Purge the gas generators during one hour! (no connection the generator to the GC)
 - Purge your sampling line during 1 hour ! (no connection the line to the GC)
 - Intelligently select the location for the instrument : no vibration, smooth Air Conditionning...



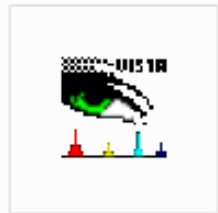
The damages created by skipping the purge of the generators will not be covered by the warranty!

Vistachrom Software



- Full analytical control
- Automatic storage of data (sample gas and calibration results)
- Visualization of the results obtained
- Full traceability for quality and audit trail purposes
- Real-time results transmitted via standard transfer protocols

Software – Log in



Vistachrom Log in

- Login : "SUPERUSER"
- Password : "1234"

Log in

Vistachrom

A red chromatogram line with several peaks is displayed on the right side of the login window.The Chromatotec logo, featuring a stylized sun rising over a chromatogram peak, with the text "CHROMATOTEC" below it.

User Name :
SUPER USER

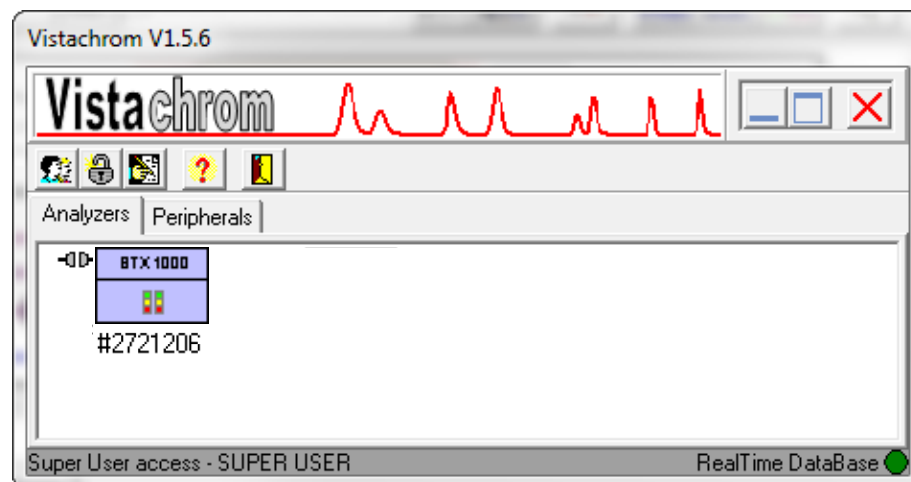
Password :
1234

✓
✗
?

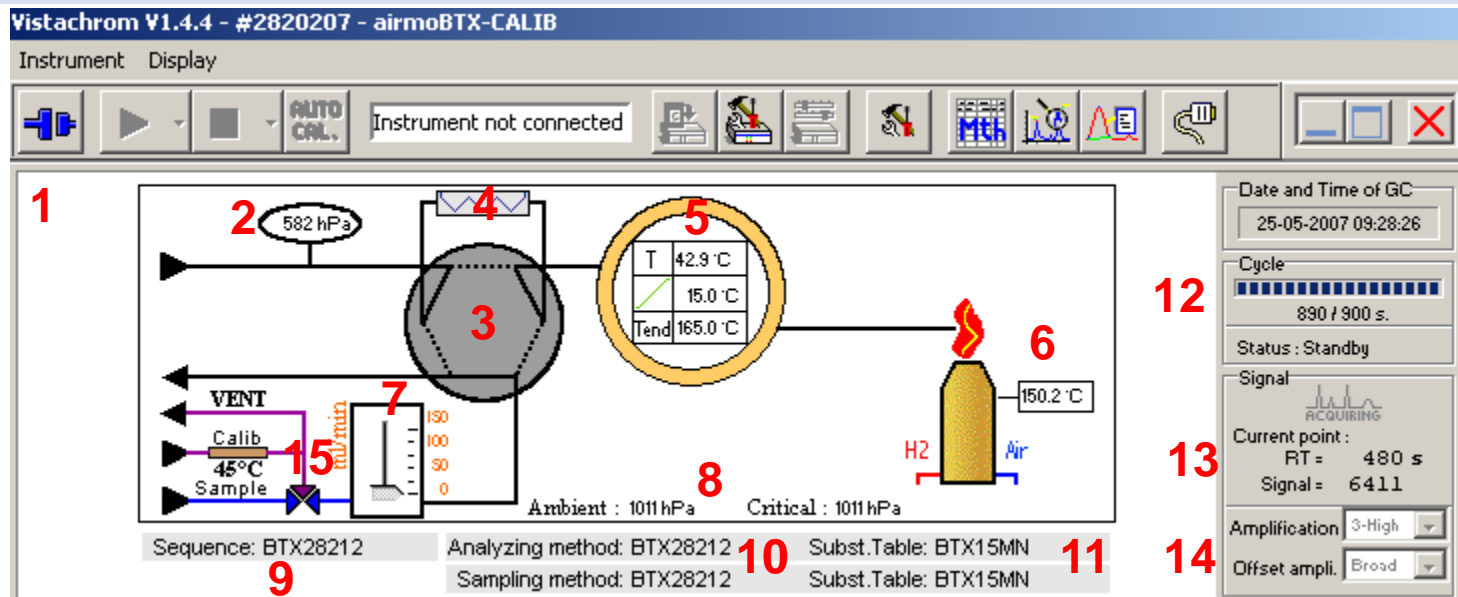
Software – “Main Window”

Main Window

- Each GC is identified by the serial number
- Double-click on the SN to open the “GC Window”



Software – “GC Window”



1: Icon to establish the communication with the PC

2: Head column PRESSURE.

3: State of the injection valve

4: trap thermodesorption state (red if active)

5: Oven temperature

6: FID detector temperature

7: Sampling flow

8: Ambient and critical pressures

9: Sequence

10: Methods (sampling / analyzing)

11: Substances table







12: Cycle and acquisition times

13: Signal value and retention times during the acquisition

14: Electrometer and Offset amplification

15: Solenoid valve for the selection of the internal system calibration

- GC and computer must be ON
- LEDs on the front panels : “stand by” and “OK” are ON

Chromatography		System	
running			OK
sampling			warning
standby			error

- Check the COM port is the one used for the communication GC-PC, usually: COM3



- Press on this icon to establish the communication GC-PC



Verifications to do, before starting the first cycles

On the software:

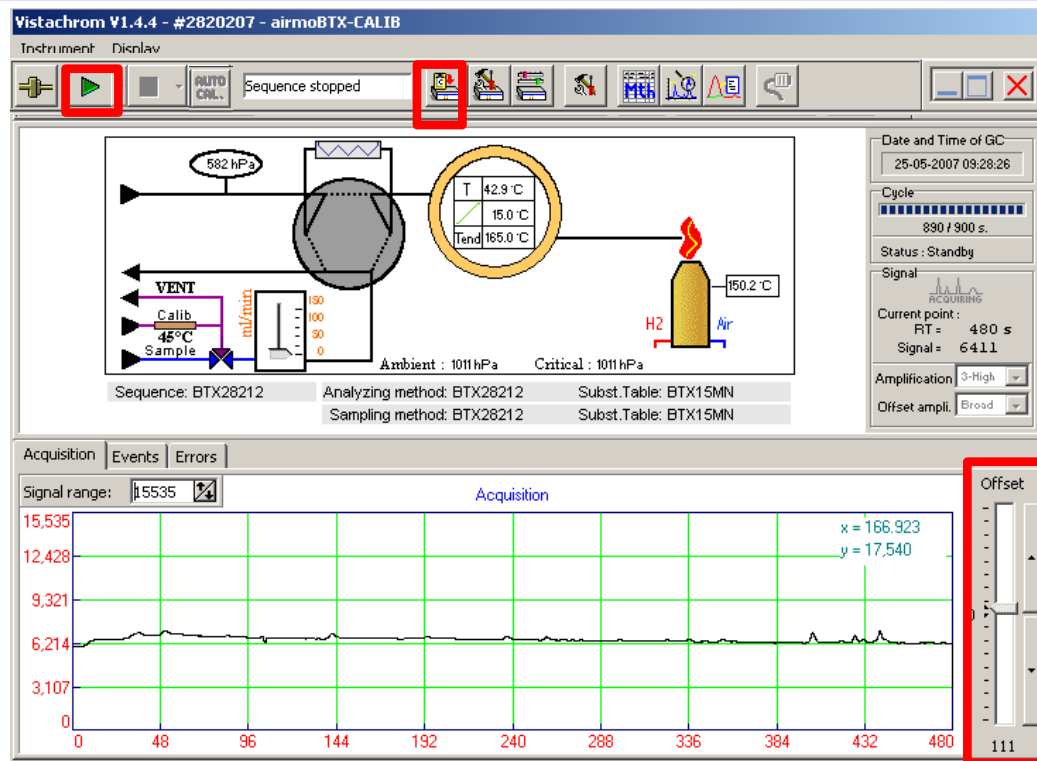
- Head column pressure
- Column temperature in stand by
- Difference between Ambient Pressure and Critical pressure (hPa) in sampling mode
- Temperature of FID
- Calibration oven temperature


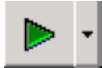
Physically on the instrument:

- Were the air and H₂ generators purged one hour?
- Is the pump ON?
- Sampling flow measurement
- Check the hydrogen/air pressure on the GC (2 and 3 bar respectively)
- Check flame is on
- Calibration flows measurements
- Install the permeation tube in the oven



Software – Analysis start



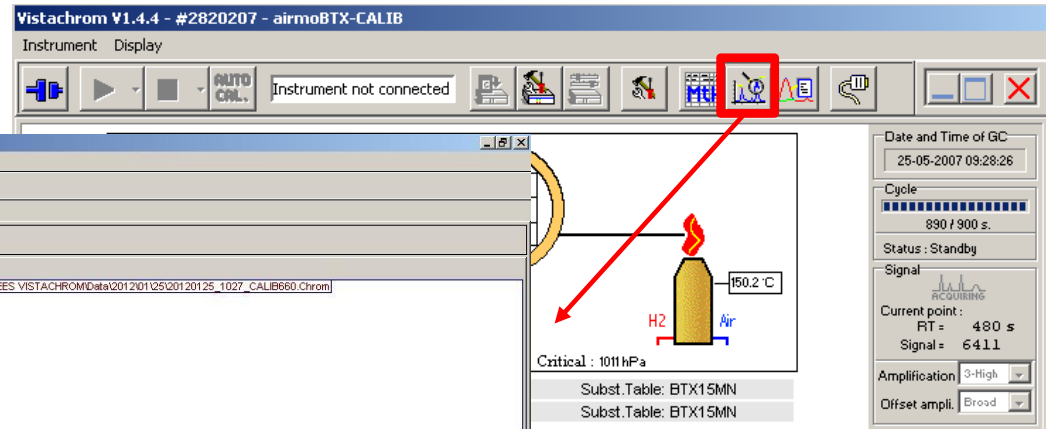
- Upload the sequence 
- Click on  to start the analysis. The first acquisition will be at the second analysis cycle. Check if during the acquisition, base-line signal is at about 3000, control with signal offset control

Data storage: 

- Data is stored as raw chromatograms and ASCII files (Excel)
- Data files are recorded and stored with date, time, and method stamp
- Data can be transmitted to data acquisition system via Modbus protocol, 4-20mA module, ...

Software – View chromatograms

PeakViewer software:

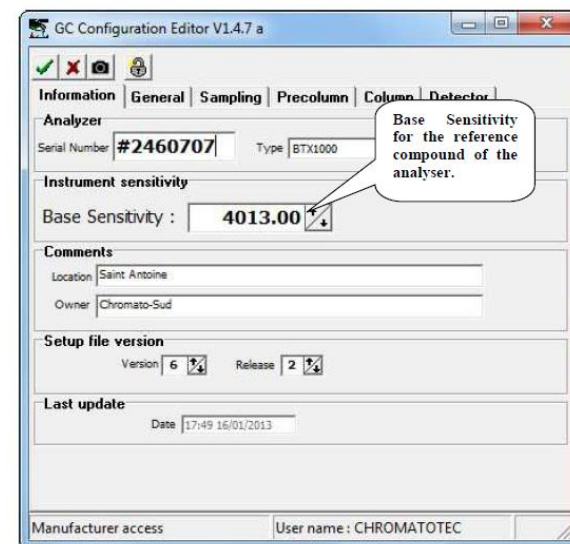


To check :

- Concentrations
- Retention times
- Trend on several days
- Post-process options
- Post-Integration options
- Statistics calculations
- ...

Base Sensitivity (BS) parameter:

airmoVOC analyzers are calibrated with a sensitivity factor called Base Sensitivity (BS).



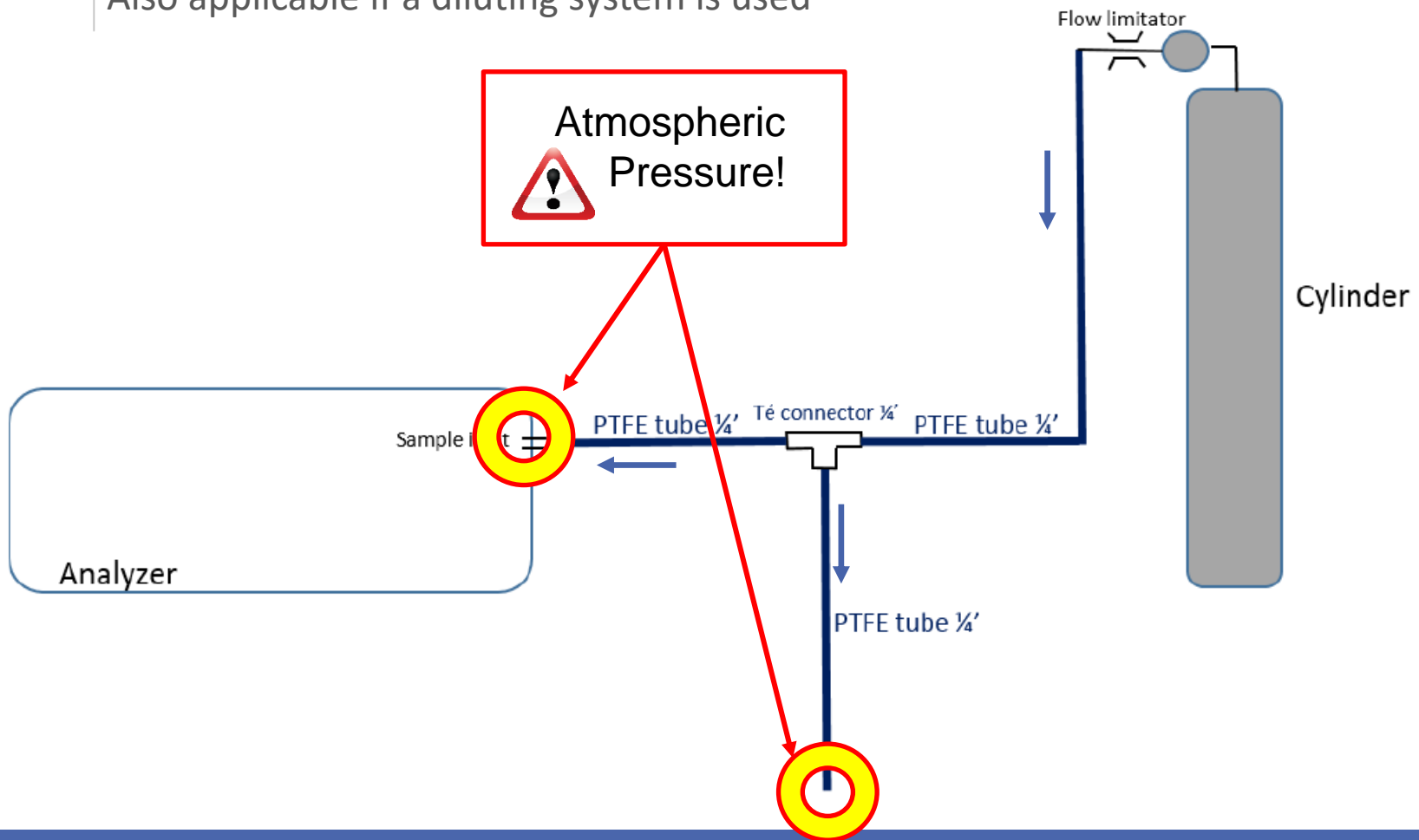
How is the Base Sensitivity (BS) calculated?

$$BS = \frac{RF \cdot Area}{C \cdot V}$$

Parameter	Unit	Name	Remark
BS	au/ng	Base Sensitivity	BS is used to know the sensitivity of an instrument
RF	None	Response Factor	RF is a constant value, displayed in the substance table, for each chemical compound
Area	au	Area below a peak	Area displayed below each peak on a chromatogram
C	mg/m3	Concentration	
V	mL	Volume sampled through the trap	V is displayed for each chromatogram, in PeakList

How to connect the external calibration cylinder?

- To obtain good results
- To protect your instrument and not create damages
- Also applicable if a diluting system is used



Every week:

- Check the chromatograms (nice base line, peaks identification, stability of retention times ...)

Every month:

- Check the operating parameters : Pressures, flows, temperatures
- Check the BS stability

Every year:

- Do the preventive maintenance actions, replacing the PM parts
- Full check of the instrument : Preset, flows, pressures, sensitivity, ...

Service – tools required

Tools you absolutely must have:



Classic tool case:

spanners, screwdrivers, ...



Leak detector



ELECTRONIC FLOWMETER
(RANGE: 1 - 750 ML/MIN)
(TESTED)
CS_OT_00005-3000

Flowmeter



Several Swagelok
fittings
(1/8 and 1/4 size)



Flow regulator



Some meters of
PTFE tubes

Tools advised for advanced users (distributors):



**TRAP TOOL FOR PRESET FOR
CALIBRATION (TESTED)**
CS_OT_00012-0001



**ELECTRONIC MANOMETER
ASSY (RANGE: -1 À 2 BARS
(RELATIVE PRESSURE))
(TESTED)**
CS_SE_00007-MANO



**MULTIMETER WITH
THERMOCOUPLE K OPTION
(TESTED)**
CS_OT_00016-0000



**CALIBRATION RESISTORS SET
FOR TEMPERATURE PRESET
(TESTED)**
CS_EL_00010-0001

Preventive maintenance kits

« One year PM kit »:

Item number	Designation	Qty
A21022		
CS_FI_00208-0000	Coalescent filter	1
AR_TU_09007-0000	O-Ring Gasket 4 x 1	2
AR_TU_09104-0000	O-Ring Gasket 6 x 1	1
AR_TU_09002-0000	O-Ring 1.5 x 0.75 mm Nitril	20
AR_EL_05019-0000	Ignitor Assy FID New	1
CS_PN_00005-0106	Rotor 6 ports 1/8" HT	1
Airmopump		
EP_SA_00004-0001	Membran and valves Kit airmoPUMP	1

« 2 years PM kit »:

Item number	Designation	Qty
Calibration		
CS_CH_01100-2014	Permeation tube Benzene - around 15 ng/min at 40°C (airmotec certified at $\pm 10\%$)	1
CS_TU_09000-0000	O-ring OR 22.5 x 1.5	1

« 3 years PM kit »:

Item number	Designation	Qty
A21022		
AR_EL_01033-0000	Set of fuses (3 x 3,15A - 1A - 315mA - 50mA)	1
AR_ME_05018-0000	Compl. Nozzle	1
AR_SA_05157-0000	Trap for airmoVOC C6-C12 or BTEX	1
CS_PN_00004-0024	Distributor 24V	1
CS_PN_00005-0002	Pneumatic actuator 6 port	1
Internal PC		
GC_CP_00001-0001	Fan (int) (Only for MK1 and MK2 computer)	1
IT_CP_00340-0128	Hard disk 128Go SSD 2,5 (SATA connection) since 03/2012	1

« 5 years PM kit »:

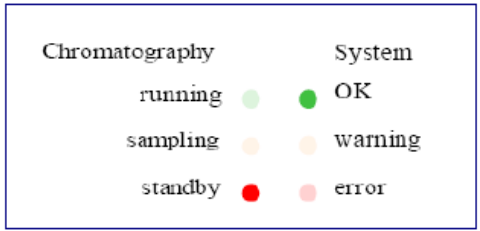
Item number	Designation	Qty
A21022		
CS_CT_01000-CPUT	CPU Board, tested, Incl. Memory supply and H8	1
CS_SE_05015-0001	Column Oven Fan 24V DC 119*119 mm	1
CS_PN_06331-0341	3-way solenoid valve stainless steel (1/8")	1

Troubleshooting – 1/5

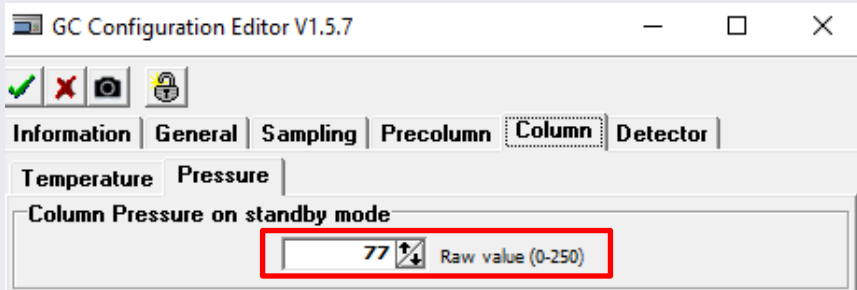


Symptom	Probable cause	Corrective action
No detection, Flat base line	Sample flow is not correct	Switch on the sampling pump Measure the sampling flow with a flowmeter
	No ignition of the flame (no condensation created at the FID outlet)	Check quality of gas (H ₂ and zero air) and check purge of gas was done before connecting them to analyzer Gas flows feeding FID are out of range (Good flows should be 180mL/min for air and 27mL/min for hydrogen) Check voltage applied on FID ignitor (should be around 1,8 V ignitor connected) Last option, dismantle FID and check spare parts inside FID
	Issue on the trap : - Trap is unpacked - The trap is never heated	Check visually state of the trap (Gas and analyzer OFF) Check if trap is hot with your finger when thermodesorption is activated Check the trap resistance (should be around 4,1 Ohms) Check that the trap is connected to the power board If you have the specific chromatotec tool, check desorption temperature
	Injection valve does not actuate	Check the Air pressure applied to the GC is 3 bar In stand by, check the ΔP (should be around 20hPa) Be sure the preventive maintenance was done on the valve (rotor, actuator...)
	Bad connection or bad state of electrodes	Check visually state of the electrodes (good spring) Check 2 electrodes are well connected on FID body

Troubleshooting – 2/5

Symptom	Probable cause	Corrective action
Impossible to log on	GC is OFF (LEDs OFF on the front panel)	Use the internal power switch to switch On the GC
	COM port used by Vistachrom is not the right one	Change the COM port used by Vistachrom
	Electronic bug	Start a « Hard reset »
	Bad state of LEDs on the front panel	<p>Check the LEDs on the front panel are like in picture below after an hard and soft reset :</p> 
No peak during calibration	No detection, flat baseline	See section « No detection, Flat base line »
	Internal calibration gas is not sampled	Check the selection valve (3 ways electrovalve) is working well
	External calibration gas is not sampled properly	Check that your calibration cylinder is connected properly to the GC, using a « te » and a vent
	Internal or external calibration gas is not set properly	<p>Check permanent and dilution flow of internal permeation oven</p> <p>Check flow coming from external calibration gas cylinder</p>

Troubleshooting – 3/5

Symptom	Probable cause	Corrective action
Peaks not identified automatically	Very unstable environnement condition	<p>Check the temperature in the lab: it must be stable: $20^{\circ}\text{C} < T < 25^{\circ}\text{C}$</p> <p>Check air conditionning/ fans are not blowing directly on analyzer</p> <p>Check the quality and the dew point of the gas used (H₂ and zero air)</p> <p>Do a clean column during one night</p>
	Wrong head column pressure	<p>Check the Air and H₂ pressure applied on the GC : must be stable at 3 bar for air and 2 bar for H₂</p> <p>Adjust the Head column Pressure to match with the QC report</p> <p>Open and close piezo valve several times (analyzer in standby, action to do manually :</p> 
	Column temperature needs more stability	<p>Check the RT are stable from a cycle to another</p> <p>Adjust the RT ranges in the substance tables</p> <p>Check « -1°C » is never displayed as the column T</p> <p>Check gradient of temperature is well followed during a cycle</p>

Troubleshooting – 4/5



Symptom	Probable cause	Corrective action
Base Sensitivity is not correct	The calibration flow is not correct	Check and adjust the calibration flow
	The permeation oven temperature is not correct	Check the Calib temperature according to the QC report
	The sample flow is not recorded correctly by Vistachrom	Check the sampling flow with an external flow meter Check the sampling flow preset using serviceGC
	Permeation tube is empty	Replace the permeation tube : every year
Concentrations values incorrect	Wrong flow on the internal calibration oven	Using an external flowmeter, measure and adjust if need the flows crossing the calibration module. Don't forget to swith OFF the sampling pump during this flow measurment.
	Wrong temperature of the internal calibration oven	Check the oven calibration oven temperature to be in conformity with the QC report
	External calibration gas is not sampled properly	Check that your calibration cylinder is connected properly to the GC, using a « te » and a vent. Check the sample and the calibration gas are provided at AMBIENT PRESSURE!

Troubleshooting – 5/5

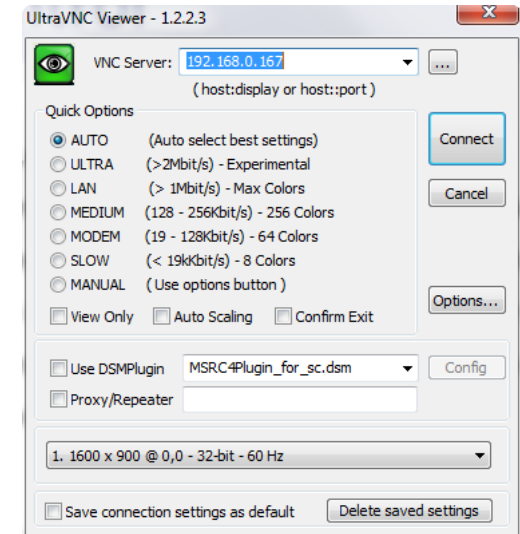


Symptom	Probable cause	Corrective action
Unwanted peaks are visible	Presence of artefacts on signal	Check there is no vibration on the GC (pump, compressor... far from analyzer) Check the quality and the dew point of the gas used (H2 and zero air)
	Pollution of the carrier gas / Pollution of the column / Trap polluted	Check the purity of the carrier gas used (purge your gas) Start a « CLEAN » sequence during one night, to remove the pollutions
	Pollution in the injection valve	Clean the rotor with deionised water, in the ultrasons bath Replace the rotor Clean the head of the injection valve
The baseline is noisy	Detector malfunctionning	Check the quality and the dew point of the gas used (H2 and zero air) Check the FID electrodes are well connected Check there is no electrical contact between the two electrodes Check there is no electrical contact between the electrodes and the column
	Detector is vibrating	Check there is no vibration on the GC
Other strange phenomenons	Hardware/software bug	Start a Hard reset and a Soft Reset, following Chromatotec procedures

Remote control

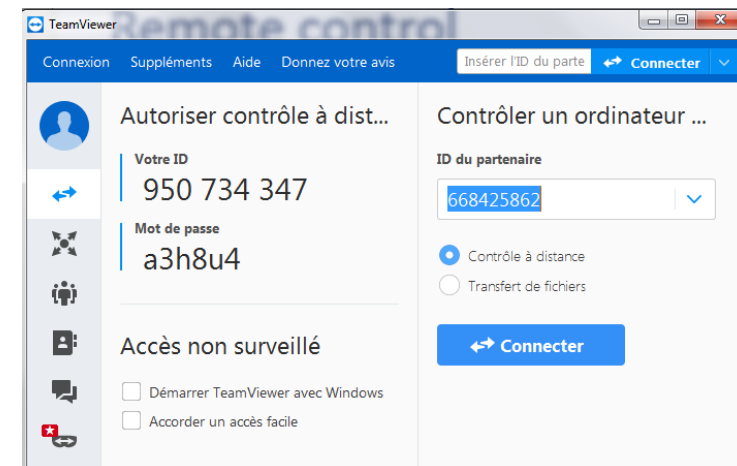
UltraVNC:

- Easy to use for local area connections
- On the Chromatotec computer, the software is automatically started at Windows start up
- On the remote computer, just write the IP address of the Chromatotec computer



TeamViewer:

- Easy to use for connections through internet
- On the Chromatotec computer, start the software from: D/TeamViewer
- On the Chromatotec computer, write down the IP and password written in TeamViewer
- On the remote computer, just write these ID and password



Pneumatic options:

- Special calibration module to check the linearity, diluting the standard gas at different ratios
- Special calibration module do dilute the calibration gas with a Mass Flow Controller
- Special inlet dedicated to an external calibration cylinder
- Use several VOC permeation tubes in the same oven
- Possibility to sample different sample streams (multiplexing system)

Sampling options:

- Purge module to extract VOC from water for online VOC in water analysis

Upgrades:

- airmoVOC C6C20+ for more VOCs
- DET QMS for online GCMS

Actual configuration:

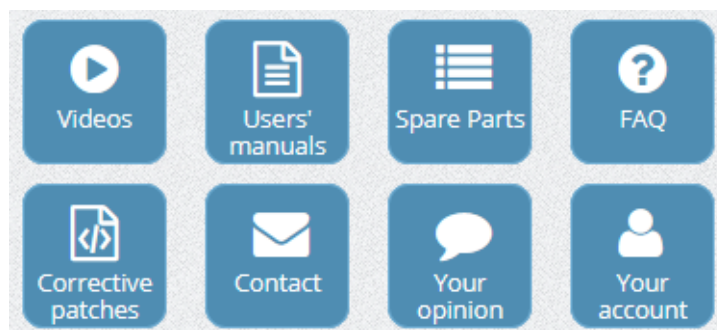
Don't be surprised when receiving your airmoVOC BTEX/C6C12 ordered recently! Here is the actual configuration:

- Sampling pump: embedded, 24VDC, located inside the rack
- New electronic boards set

Visit our technical website

We highly recommend you to have a look to our technical website.

<https://support.chromatotec.com/>



It is really helpful to:

- ✓ Start
- ✓ Understand the GC functioning
- ✓ Calibrate
- ✓ Maintain
- ✓ Solve a problem

Thanks!

Thanks for choosing the airmoVOC BTEX/C6C12!



→ Future training sessions :

- New Vistachrom options
- DetNH3
- New electronic boards
- ...

→ Previous training sessions :

- Already available on the Chromatotec website